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77. **By O. H. Merrill, Watertown, N. Y.**—Within the circumference of a given circle, radius r, describe two equal circles, radii $\frac{2}{3}r$, which shall touch the first circle internally at opposite extremities of a diameter. Describe a fourth circle D, touching the first circle internally and each of the two equal circles externally. Describe a fifth circle E, a sixth circle F, &c., touching the first internally and one of the two equal circles and the circle D, E, F, &c., respectively, externally. Find an expression for the radii of the circles E, F, G, &c.

78. **By Prof. J. Scheffer, Gambier, Ohio.**—From a given point without a triangle to draw a line which bisects the area of the triangle.

79. **By Henry Gunder, Greenville, Ohio.**—Prove that the formula $2^{n-1}(2^n - 1)$ represents a perfect number when $2^n - 1$ is prime.

80. **By Prof. A. B. Evans, Lockport, N. Y.**—The relation

$$\underline{|n} = 1 + A_1\frac{n}{\underline{|1}} + A_2\frac{n(n-1)}{\underline{|2}} + A_3\frac{n(n-1)(n-2)}{\underline{|3}} + \dots + A_n\frac{\underline{|n}}{\underline{|n}}$$

is true for all positive integral values of n; show that

$$\frac{Ar}{\underline{|r}} = 1 - \frac{1}{\underline{|1}} + \frac{1}{\underline{|2}} - \frac{1}{\underline{|3}} \dots + \frac{(-1)^r}{\underline{|r}},$$

where r is an integer less than n.

81. **By G. W. Hill, Nyack Turnpike, N. Y.**–"Prove that, *identically*,

$$\frac{1}{n+1} + \frac{1}{n+2} + \frac{1}{n+3} + \dots + \frac{1}{2n} = 1 - \frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \dots - \frac{1}{2n}."$$

82. **By Prof. A. Hall, Naval Obs., Washington, D. C.**—If the parabolic orbits of two comets intersect the circular orbit of the earth in the same two points, then if t_1 and t_2 be the times in which the comets move from one point to the other, $(t_1 + t_2)^{\frac{2}{3}} + (t_1 - t_2)^{\frac{2}{3}} = \left(\frac{4}{3\pi}\right)^{\frac{2}{3}}$: a year being the unit of time.

ERRATA.

On page 88, 1st line, the exponent of the factor $(1 - f')$ should be $\frac{3}{2}$.
" 91, line 13, for 396 read $396x$.
" 95, " 6 from bottom, for "*nn.*" read nn'.
" 99, " 15 from bottom, for make read mark.
" 100, " 18, for f, g, read f', g',.
" 103, " 22, for number read numerator.
" 107, " 18, for ρ_2^2 read ρ_3^2.
" 109, " 14, after first parenthesis insert ρ_1^2.
" 118, Fig. 5, for "A" within the figure read H.